

## ABSTRACT

A sensor or a sensor array connected to an electrical measuring apparatus is disclosed. In one embodiment, at least one sensor contains a layer of conductive modified particles which forms an electrical pathway or electrical circuit between two electrodes which are connected to an electrical measuring apparatus. In another embodiment, the first sensor contains at least one region of a nonconducting material and also a region that contains one or more modified particles. The modified particles are preferably conductive. An electrical path exists through the regions of the nonconducting material and the region containing the modified particles. The modified particles are conductive and more preferably are pigment particles such as modified carbon black, wherein the modified particles have attached at least one organic group. Alternatively, or in addition, the modified particle can be an aggregate having a carbon phase and a silicon-containing species phase and/or a metal-containing species phase wherein the aggregate optionally has attached at least one organic group. A sensor array for detecting an analyte in a fluid is also disclosed wherein each sensor emits a different response signature to an analyte wherein at least one of the sensors contains at least the modified particles as described above. Also, the present invention relates to a method for detecting the presence of an analyte in a fluid. The method involves contacting one or more sensors as described above with the analyte to generate a response and detecting the response with a detector that is operatively associated with each sensor in order to detect the presence of an analyte. Other advantages and embodiments are further described.